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Author(s): Andrew Barker

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Musical Theory and Philosophy: The Case of Archestratus

Andrew Barker

*University of Birmingham, Institute of Archaeology & Antiquity, Arts Building,
Edgbaston, Birmingham B15 2TT, UK
andrewqbarker@hotmail.com*

Abstract

Little is known about the harmonic theorist Archestratus (probably early 3rd century BC). Our only substantial information comes from Porphyry, who quotes a brief comment by a certain Didymus on his epistemological stance, and seeks to justify it through reflection on a rather startling technical doctrine which Archestratus propounded; and from Philodemus, who comments scathingly on his view of the relation between harmonic theory and philosophy. Neither passage is easy to interpret; this paper tries to make sense of them, and to set them in an intelligible relation to one another. It argues that the doctrine recorded by Porphyry becomes comprehensible when it is placed against the background of Aristoxenus' work in harmonics, and it discusses Porphyry's inferences about the way in which his epistemological position diverged from that of Aristoxenus. It argues that Philodemus' report gives evidence of Archestratus' interest in issues of central concern to philosophy and in particular of an engagement with Aristotelian thought; it tries to identify some specific questions which attracted his attention, and to explain how he seems to have answered them, and why. It suggests that the two reports can be brought together as elements in a single, though fragmentary picture, and finally that Archestratus can be assigned an interesting though minor role in the history of Peripatetic philosophy and science.

Keywords

harmonics, Aristoxenus, Peripatetics, epistemology, definitions, science and philosophy

Introduction

In the course of his commentary on Ptolemy's *Harmonics*, Porphyry mentions a musical theorist named Archestratus and tells us a little about his

ideas.¹ The only other substantial information we have about his writings in this area comes from Philodemus, loaded with his characteristically caustic abuse,² and we shall consider his remarks later. For the present it is enough to record that they clearly date Arcestratus to a time not only earlier than Philodemus but also earlier than Diogenes of Babylon (c. 240-152 BC), who is the main target of Philodemus' criticisms throughout the surviving parts of his *De musica*. Other theorists' ideas, including those of Arcestratus, were relevant to Philodemus' agenda only in so far as Diogenes had used them in support of his own position. Arcestratus was certainly at work after Aristoxenus, as we shall see, though probably not by much, and their life-times may in fact have overlapped. A date in the early third century BC seems likely.³

In the first part of this paper I shall explore the contents of the unusual theory attributed to him by Porphyry, in so far as they can be recovered from the cursory account he gives.⁴ Its initial contention is striking and at first sight outrageous: "he declared that there are just three notes in all" (26.31-2). I shall try to show that it is nevertheless comprehensible, and that although it has no exact parallel anywhere else in the ancient sources (most of whom identify 28 distinct notes in the "perfect system" in which all harmonic relations are contained), it can be related intelligibly to theses propounded by mainstream writers and in particular by Aristoxenus. Nor are the passage's superficially arid contentions mere exercises in scholastic ingenuity; they engage with issues of real significance to musicians, and to anyone seeking to understand the resources and strategies of melodic composition. This part of my discussion will involve some fairly recondite

¹) Porph. *In Ptol. Harm.* 26.26-27.16 Düring.

²) Philodemus *De musica* Book 4 col. 137.13-27 Delattre.

³) This is perhaps the same Arcestratus who is represented at Athenaeus 634D as the author of a work *On Auletes* in two books. Conceivably he is the Arcestratus of Syracuse (4th-3rd century BC) who wrote a *Rules of Conduct*, and a *Gastronomy* parodying the *Astronomy* of Cleostrates of Tenedos (of which we learn from a series of passages in Athenaeus Book 7); but although it would fit well with my estimate of his date, this possibility strikes me as rather remote.

⁴) So far as I know, the only substantial published discussion of the passage is I. Düring, "Ett fragment av musikern Arcestratos", *Eranos* 29 (1931), 93-102. But it seems to me (on the basis of a translation kindly provided by a Swedish acquaintance) to shed very little light on the issues with which I am concerned.

technicalities, which I hope I have made intelligible to readers unfamiliar with the intricacies of Greek harmonic theory.

The second section of the paper considers the way in which our sources represent the general character of Arcestratus' work in musical theory, and in particular its author's claim, pilloried by Philodemus, that it had substantial connections with philosophy. I shall argue that our evidence, slight though it is, suggests at least three points, quite closely related to one another, at which it links up with central philosophical issues: in its interest in definitions and its adoption of a particular view of their character; in its dealings with the relations between matter and form; and in its implications about the roles and the relative importance of the faculties of sense-perception and reason in musical analysis. The third of these issues was much discussed by harmonic theorists of the Hellenistic and later periods (some of the main texts on the subject will be mentioned below); but it was already quite vigorously in play in the fourth century, as we can see, for instance, from Plato's pugnacious remarks at *Rep.* 530c-531c, and Aristoxenus' equally pungent comments at *El. harm.* 32.18-31. In general terms, the division between champions of reason and champions of sense-perception marks off the distinction between theorists (usually labelled as "Pythagoreans", but including Platonists and others) who held that the principles and methods proper to harmonic science are those of mathematics, and on the other hand those (especially Aristoxenians) who contended that harmonics is essentially an empirical science, and that the phenomena it investigates are governed by principles peculiar to its own domain, about which mathematics can tell us nothing. (This is a fairly crude summary of an intricate set of distinctions – a good many subtly different nuances of opinion are recorded – but it will serve for present purposes. For a little further detail see Part 2.3 below.) Arcestratus' contributions to debates on these matters were probably not strikingly original; it will become clear that they rest largely on his reflections on the work of Aristoxenus, and that his conclusions differ from Aristoxenus' more in their emphasis and their level of abstraction than in any substantial points of disagreement. But I shall try to show that if we set the evidence of Porphyry and Philodemus against the background of Aristoxenian theory and of Peripatetic thought in general, he will turn out to be quite an interesting figure in a minor way, not only in the history of Greek harmonics but in the history of philosophy too, and its relationship with the special sciences.

Part 1: An Interpretation of the Theory Reported by Porphyry

1.1 Preliminaries

Porphyry's report on Archestratus is set in the context of a long discussion of the views of harmonic theorists on the criteria of reason and sense-perception. It falls between two substantial excerpts quoted from a work by a certain Didymus, his *On the Differences between the Aristoxenians and the Pythagoreans*, which are devoted entirely to this topic.⁵ The first reference to Archestratus in Porphyry's text is in fact in a sentence quoted from Didymus (26.27-9), and it is possible that in the rest of the passage he is abbreviating and commenting on material that he also found in Didymus' treatise. But I think it unlikely. The beginning of the sentence which follows the quotation from Didymus, "It would be helpful to digress a little and clarify this man's [i.e. Archestratus'] approach", seems to indicate fairly clearly that what follows is an intervention by Porphyry himself. Secondly, the extensive excerpts from Didymus' discussion of the harmonic theorists' views on the criteria contain no comparable summaries of the content of their doctrines. He anatomises their opinions about the roles of the two criteria in some detail, but he nowhere attempts to argue in favour of his diagnoses on the basis of their contentions about substantial issues in harmonics itself; Porphyry, by contrast, uses this strategy repeatedly. Probably, then, the report on Archestratus' theory is independent of Didymus, and in that case Porphyry must have found his information about him elsewhere. There seems to be no way, unfortunately, in which we could identify his source.

⁵ Porphyry gives the title at 25.5-6, and in a slightly different form at 5.11-13. The identity of this Didymus (regularly named by Porphyry and Ptolemy as Δίδυμος ὁ μουσικὸς) is uncertain, but he may be the same Didymus who is located by the *Suda* in the time of Nero. His work was evidently extensive and detailed. Ptolemy discusses some of his contributions to harmonic theory in *Harm.* Book 2 ch. 13, and sets out his "divisions" in the tables of the following chapter. Porphyry quotes from his work at some length (26.6-29, 27.17-28.26) in the context that concerns us here, where Didymus is apparently building on the discussions of an earlier writer, Ptolemaïos of Cyrene (perhaps 1st century BC), quoted by Porphyry at 22.22-24.6, 25.3-26.5. Porphyry also borrows from Didymus a detailed account of a report in which Archytas expounded a procedure adopted by his Pythagorean predecessors (107.15-108.21). Ptolemy was certainly using the same source in his own critical discussion of the procedure, though he does not say so; and this lends some colour to Porphyry's insinuation (5.11-14) that Ptolemy owed a good deal to Didymus which he does not acknowledge.

The passage falls into two sections. In the first of them, Porphyry sets out, in summary form, a theory which he attributes to Archestratus, and which seems at first sight to have no bearing on questions about the roles of reason and sense-perception in the business of harmonic science. The second section adds almost no new information about the theory's content; it is a passage of commentary by Porphyry himself, designed to show that the theory, as he has outlined it, does indeed justify certain conclusions about the ways in which Archestratus uses the two criteria, and clarifies the sense in which, as Didymus had said, he gives one of them priority over the other. In Part 1 of this paper I shall discuss only the material in the first of these sections; Porphyry's arguments in the second will be examined in Part 2.3.

1.2 *An Initial Reading of Porphyry's Report*

I shall not consider all the problems posed by the imperfect state of the text. The MSS tradition is certainly corrupt, and Düring suggested a number of emendations and supplements in his edition, some of which are incorporated into the printed text; other emendations were later proposed by Alexanderson.⁶ Most of the textual issues, however, affect relatively minor details of the way in which the theory is expounded rather than its main substance, or minutiae which will interest only specialists in harmonic theory, and I shall comment on them only briefly; a few additional reflections will be found in an appendix at the end of the paper. I shall start by reproducing and translating, as best I can, the text of the first part of the passage as Düring prints it, breaking off at the point (27.7) where the exposition of Archestratus' theory ends and Porphyry's discussion begins.

[26.26] Ἐπιδείξας δὲ διὰ πλείονων τὸ λεγόμενον, οἷς ὕστερον εὐκαιρότερον χρῆσόμεθα, ἐπάγει· ἄλλοι δ' εἰσὶν, οἱ ἀμότερα μὲν τιθέασιν αἴσθησίν τε καὶ λόγον, ἥδη δὲ τῷ λογῷ προνομίαν τινὰ ἀποδιδόασιν, ὧν ἐστὶ καὶ Ἀρχέστρατος."

Οὐκ ἀχρεῖον δ' ἂν εἴη παρεκβατικώτερον καὶ τούτου σαφηνίσαι τὸν τρόπον ἕνεκα διορισμοῦ τῶν νῦν ἡμῖν χρειωδῶν. ἀποφηνάμενος γὰρ οὗτος τρεῖς εἶναι τοὺς σύμπαντας φθόγγους, βαρύπυκνον, ὀξύπυκνον, [27.1] ἀμφίπυκνον, βαρύπυκνον μὲν ἀφ' οὗ πυκνὸν ἐστὶν ἐπὶ τὸ βαρὺ θεῖναι, ὀξύπυκνον δ' ἐναντίως ἐξ οὗ πυκνόν

⁶ B. Alexanderson, *Textual Remarks on Ptolemy's Harmonics and Porphyry's Commentary*, Gothenburg 1969.

ἐστὶν ἐπὶ τὸ ὀξύ θεῖναι, ἀμφίπυκνον δὲ τὸν μεταξύ' τούτων ἔχοντά φησιν ἐνδέχεσθαι· καὶ ἐνὶ φθόγγῳ κατέχεσθαι, ἐπειδὴ δυνατόν ἐστι πλείους τάσεις τοῦτον <δέχεσθαι> καὶ πλέξαι ἐν αὐταῖς μέλος ἐνὸς εἵδους μενούσης τῆς τάσεως, ὡς <δυνατὸν τὰς ὑπάτας> ἀμφοτέρας καὶ <τὴν> παραμέσῃν καὶ τὰς πάσας τοιαύτας ὀξυπύκνους εἶναι φθόγγους, ὥσων φῆ ἐκεῖνος.

After supporting what he [Didymus] has said with further evidence, which I shall use more appropriately later, he adds: "And there are others who give a place to both perception and reason, but who assign a certain priority to reason; one of them is Arcestratus."

It would be helpful to digress a little and clarify this man's approach, to the extent that it will assist in outlining things that are useful to us now. He declared that there are three notes in all, the *barypyknos*, the *oxypyknos* and the *amphipyknos*. He says that the *barypyknos* is the one from which one can place a *pyknon* on the lower side, the *oxypyknos*, conversely, is that from which one can place a *pyknon* on the upper side, and the *amphipyknos* is that which takes the position between them. And each of them is embraced in a single note, since it is possible for it <to occupy> several pitches, and to weave a melody among them while the pitch continues to be of one form, as <it is possible> for both <of the *hypatai*> and <the> *paramesē* and all such notes to be *oxypyknoi*, or so he says.

If we are to make sense of Arcestratus' thesis, we need first to understand what is meant by the terms *barypyknos*, *oxypyknos*, *amphipyknos* and *pyknon*. The *pyknon*, in the jargon of harmonic theorists, is a small structure located in the lower part of a tetrachord; a tetrachord, in the sense relevant here, is a sequence of four notes spanning in all a perfect fourth, whose boundaries are fundamental (or "fixed") notes of the scale. The *pyknon* contains the lowest note of the tetrachord and the two immediately above it, together with the two intervals separating the first from the second and the second from the third. Properly speaking, it only counts as a *pyknon* (something "compact" or "compressed") if it occupies less than half the full span of the tetrachord,⁷ and for that reason occurs in only two of the three "genera" of Greek scales (in the enharmonic and the chromatic but not in the diatonic, in which no two successive intervals satisfy this condition); but for the present we can ignore this complication.

It will become clear that Arcestratus belongs in the Aristoxenian tradition, rather than that of the Pythagoreans and other mathematical theorists. Terms such as *barypyknos* do not occur in Aristoxenus, but he too

⁷ In his apparatus Düring suggests reading τὸν τὸ μεταξύ, which would indeed convey the sense apparently intended more clearly.

⁸ See e.g. Aristoxenus *El. harm.* 24.11-14, 50.15-19.

comments on notes classified in a comparable way, using the phrases “the lowest of the notes in the *pyknon*”, and so on, to convey his meaning. (See *El. harm.* 69.29-72.28, a passage to which we shall return.) *Barypyknos* and *oxyppyknos* reappear in later compendia of Aristoxenian harmonics, referring to the two outer notes of the *pyknon*; the word they generally use for its middle note is *mesopyknos*, rather than Archestratus’ *amphipyknos*; and they sometimes add a fourth category, the *apyknoi*, which are those notes which have no place in the *pyknon* at all.⁹ The variation between the terms *amphipyknos* and *mesopyknos* is relatively unimportant, and we shall find a fairly straightforward way of justifying Archestratus’ limitation of the number of categories to three, implicitly denying that any note is *apyknos*. What is strange about his classification is that if the received text at 27.1-2 is even approximately correct, he apparently puts the *oxyppyknos* and the *baryppyknos* the opposite way round from all other comparable writers. In their work – as we would probably expect – the *baryppyknos* is always the lowest note of a *pyknon* and the *oxyppyknos* is the highest. As the text of Porphyry’s report on Archestratus stands, by contrast, it says quite unambiguously, so far as I can see, that the *baryppyknos* is the note with a *pyknon* on its lower side, and the *oxyppyknos* is the note with a *pyknon* on its upper side; that is, the *baryppyknos* is the highest note of a *pyknon* and the *oxyppyknos* is the lowest.

This is very odd, but for my purposes here it is of no great consequence. I suggest in the Appendix a way in which the difficulties might be eliminated, but the core of Archestratus’ approach will remain substantially unaltered whether or not my tentative proposals are accepted. The remarkable announcement with which Porphyry begins the main part of his report, “there are three notes in all”, or “the sum total of all the notes is three”, seems designed to be an arresting and deliberately provocative slogan, possibly preserving the words of Archestratus himself; if a papyrus containing his treatise emerged from the sands of Egypt or the ashes of Herculaneum, it would not surprise me to find that it was the opening statement of one of its major sections. Porphyry goes on to elaborate it in two ways. First, we are told that the three notes in question are the highest, lowest and middle notes of the *pyknon*; and to which of them each label is attached makes very little difference. Secondly, if I have interpreted the

⁹ See e.g. Cleonides *Harm.* 195.8-198.13 Jan, Aristides Quintilianus *De mus.* 9.13-24 Winnington-Ingram.

sentence that follows (27.3-7) correctly, it explains that each of these notes can appear at various different pitches, so that it is possible to “weave a melody” using pitches which by these criteria are all instantiations of one and the same note; and this is because throughout the sequence the “form” (*eidos*) attached to each pitch will remain the same.

There is an ambiguity in Porphyry’s syntax here, however, and perhaps also in the reference of one pivotal term; my interpretation might be challenged on either of these grounds, and I need to defend it. The syntactical problem arises because in the crucial clause, πλέξαι ἐν αὐταῖς μέλος ἐνὸς εἶδους μενούσης τῆς τάσεως, the words ἐνὸς εἶδους, “of one form”, might be taken with μέλος, rather than with the words that follow. That would give the sense “to weave a melody of one form while the pitch remains constant”. From a linguistic perspective that reading is unobjectionable. But at least if we construe it in what seems the most obvious way it cannot be right, not only because a sequence of notes at a constant pitch can hardly be called a melody, but also, more conclusively, because no matter how the text of the next clause should be emended, its purpose is plainly to identify several differently pitched notes which an example of such a melody could contain. Further, I can attach no relevant sense to the expression “a melody of one form”.

I conclude, then, that the proposal that we should take ἐνὸς εἶδους with μέλος cannot be sustained; it must be closely associated with μενούσης τῆς τάσεως, and we must translate “while the pitch remains of one form”. I interpret this as meaning “while each pitch used in the melody has the same form”, where the “form” attached to each pitch is that of being a *barypyknos*, for example. The pitches themselves are different, but because from a musical perspective, by Arcestratus’ criteria, they are all instances of the same note, in this sense they share a single form. But it might be argued, secondly, that I am mistaken in treating the word τάσις, “pitch”, as referring to the pitch of each note in the melody. Perhaps it refers rather to the overall pitch-range of the scale that is being used, and what the author is trying to convey is that one can “weave a melody” using nothing but *barypyknoi*, for example, even without modulating between one scale (or “key”) and another.¹⁰ He expresses this by saying that the pitch-range “retains the same

¹⁰ This qualification might be thought important, since it will obviously be possible to construct a melody out of notes all of which have the same position in their respective scales, if each of them has that position in a scale of a different key.

form”, so the argument would continue, because when one modulates from one key to another, the pattern of intervals contained in any given range of pitch will be altered, and theorists commonly refer to the pattern of intervals contained within an octave, for instance, as its “form” (we shall return to both these points at a later stage). But there are at least two reasons why this suggestion, too, must be rejected. First, when Greek writers refer to a range of pitch rather than to a particular point of pitch, the word they regularly use is not *τάσις* but *τόπος*, “place”.¹¹ Secondly, I know of no instance in which a theorist uses either of these terms when referring to the “form”, in this sense, of the material used in the melody; they never call it the form of the *τόπος* or *τάσις*. In most cases they identify such forms as those “of” some specific interval (“the form of the fourth”, “the form of the octave” and so on), meaning by this the forms in which the notes falling within this span can be arranged; the implication is that they are forms of the *συστήματα*, the scale-segments or “systems” contained within such an interval.¹² It is the *σύστημα*, not the pitch or the pitch-range, which has a structure capable of changing or staying the same. I very much doubt that any Greek reader could possibly have understood the clause we are considering in the way that this suggestion requires.

I have spent some time defending my interpretation of this clause because a good deal will hang on it, and in particular on the way in which the author uses the term *εἶδος*, “form”. If my approach is correct we are entitled to infer that the assertion “there are just three notes” needs to be expanded. What gives a note its distinct identity is its “form”, defined by its position in the *pyknon*, not by its pitch; a pitch can be said to have such a form only in so far as it instantiates a note in one of these scalar positions. What Arcestratus means, then, is that each note is defined exclusively by its possession of one of just three forms; any other feature it may have, such as its pitch, is irrelevant to what it essentially is. In that case it will indeed be possible to construct a melody which uses various different pitches but contains only one “note”. (It will admittedly be a rather rudimentary melody. If we ignore the possibility of modulation between different genera and *tonoi*, there are at the most five notes, spaced out widely in the two-octave system, which in the terminology of the

¹¹⁾ For this use of *topos* see e.g. Aristoxenus *El. harm.* 7.10-28.

¹²⁾ The implication is made explicit, for instance, at Aristides Quintilianus *De musica* 14.27-15.2 with its context; for the usual way of designating these *εἶδη* or *σχήματα* see e.g. Aristoxenus *El. harm.* 74.10-25, Cleonides 195.4-199.3.

received text of Porphyry will count as *barypyknoi*, together with five *amphipyknoi* and eight *oxytyknoi*.)

1.3 *Aristoxenus and the Musicological Background to Arcestratus' Theory*

Porphyry's exposition by itself gives little scope for any fuller interpretation of Arcestratus' thesis. But we may be able to make some progress by looking at its relationship with aspects of the work of other writers in the Aristoxenian tradition. We should focus first on the proposition that the identity of a note depends wholly on its "form", and is independent, in particular, of its pitch. This contention has clear affinities with a doctrine of Aristoxenus. At *El. harm.* 36.2-14, in the course of a list of the "parts" of harmonic science, he specifies the third part as the one that discusses notes. It asks "how many there are and by what they are recognised, and whether they are pitches, as most people suppose, or *dynamis*, and this too, what precisely a *dynamis* is" (36.8-13). Our incomplete text of the treatise breaks off, unfortunately, before Aristoxenus reaches his discussion of these issues; but there is no doubt about what his answer would have been to the question: "Is a note to be defined by its pitch or by its *dynamis*?" He unquestionably held that it is the latter. The snippet I have quoted strongly suggests as much, not only because it says that we must work out exactly what a *dynamis* is, but also, more obviously, because the view that it is its pitch that gives a note its identity is the one to which "most people" (*hoi polloi*) subscribe, and as I have remarked elsewhere, in Aristoxenus' writings "most people" are invariably wrong. He very rarely allows himself to concede, in fact, that anyone apart from himself has ever been right about anything. If any doubts remain, they should be put to rest by the prominent role that Aristoxenus assigns to *dynamis* in the remainder of *El. harm.* Book 2 and in an important passage of Book 3.

I cannot offer a full discussion of the Aristoxenian concept of *dynamis* here.¹³ For the present we may perhaps be content with a rough modern parallel. We commonly identify a note by its pitch (e.g. "middle C"); and the concept of pitch is still at work when we use similar terminology to identify a class of equivalent notes pitched in different octaves (e.g. "C natural"). But we can also designate a note by reference to its "function" in

¹³ Readers interested in pursuing the issue may get some help from my remarks in A. Barker, *The Science of Harmonics in Classical Greece*, Cambridge 2007, 183-92, and other allusions to *dynamis* cited in the book's index.

the prevailing tonal environment. Thus B natural, for instance, is the “leading note” if its environment is the scale of C major, but the “dominant” in the environment of E major, and so on. Conversely, if some note in a particular tune is the leading note (for instance the penultimate note of “The British Grenadiers”), it remains the leading note regardless of the key or the range of pitch in which the piece is performed. What the note in question *is*, from a melodic perspective, is defined by its function and not by its pitch. Expressions such as “leading note” and “dominant” pick out what certain sounds, in their aspect as musical notes, are being and doing in the relevant context.

The parallel between modern conceptions of function and the *dynameis* of notes in Greek music is at best only very approximate, even if we restrict the scope of our “modern” comparisons to tonal music of a straightforward sort; the concept and the principles of “harmonic progression”, on which modern classifications of function are based, were wholly unknown to the Greeks. But such comparisons are not entirely useless. Suppose, for instance, that we have not yet heard a certain melody, but are told by our teacher that at some moment in its course it arrives on the leading note; and suppose further that the melody is of an entirely conventional and familiar kind. We can infer with reasonable probability from what we have been told (as we could not if we were told only about the note’s pitch) a number of conclusions about the dynamics of the melody at this point. We would expect it to be a moment of tension that needs to be resolved, and (with a rather lower level of probability) that it points in a certain direction and will be resolved in a particular way. We would certainly not expect it to be a moment at which the melody comes to rest. The notion of *dynamis*, as Aristoxenus uses it, has at least some affinities with “melodic function” of this kind. A note’s *dynamis* depends on its position in the structure of the prevailing scale, and it plants expectations in the listener about the directions in which the melody is (and is not) likely to proceed from that point. When we listen to a melody we do not merely register one pitch after another. We interpret it as something with an inner dynamism, propelling it in directions for which its previous movements have prepared us, and raising expectations which a clever composer may sometimes deliberately refuse to fulfill, creating moments of enjoyable or baffled surprise. In Greek terms, what arouses these expectations is our implicit reading of the sequences we hear as “dynamic”, constituted by notes whose melodic significance lies not in their pitches but in their *dynameis*, their “functions” or “powers”.

When Arcestratus attaches the identity of a note to something other than its pitch, the word he uses is not *dynamis* but *eidos*, “form”. On any construal of his meaning, this is a departure from the way in which *eidos* is used elsewhere by Aristoxenian writers. It is a term in their technical vocabulary too, but it refers, as we have seen, to something completely different, that is, to the arrangement of intervals within a structure comprising an octave, a fifth or a fourth; it is interchangeable with the term *schêma*, “shape”. A perfect fourth made up of two tones and a semitone, for instance, can appear in three different “forms”, depending on whether the semitone is at the top, at the bottom or in the middle.¹⁴ “Form”, conceived in this way, can evidently not be used to define the identity of an individual note. As my discussion continues it will become more and more obvious that in many respects Arcestratus was following closely in Aristoxenus’ footsteps. Aristoxenus distinguishes the view of “most people” that a note is to be defined by its pitch very emphatically from his own contention that a note is a *dynamis*, and gives the distinction a prominent role in his arguments; and the parallel between this distinction and Arcestratus’ contrast between a note’s defining *eidos* and its (essentially irrelevant) pitch can hardly be coincidental. I conclude that Arcestratean *eidos* and Aristoxenian *dynamis* are intimately related. Given his familiarity with the *Elementa harmonica* (of which we shall see more evidence as we proceed), Arcestratus’ adoption of a different name for his conception must have been deliberate, and at a later stage I shall make a guess at the reason for his choice.

The similarity between the two concepts should not be exaggerated, however; they are not exactly the same. Unlike some of his later followers, Aristoxenus does not give us (in his surviving works) a complete list of the notes that he recognises as distinct. But the plethora of different notes to which he assigns different names and different roles in the course of the *Elementa harmonica* guarantees that they will not be completely defined by their positions in the *pyknon*. On the other hand, we should notice a passage where he makes the point that when we have various pairs of notes, each pair of notes will differ from the others “in respect of *dynamis*” even when the notes in each pair are separated by the same interval, and, he says, it is because they differ in *dynamis* that they are different and are given different names. It turns out that both the notes in any one of the pairs which he uses as examples are related to the *pyknon* in the same way, and

¹⁴ For references see n. 12 above.

differ in this respect from the notes in all the other pairs (*El. harm.* 47.29-48.2). This is not something that Aristoxenus says explicitly, but it looks as if a note's *dynamis* and its position in the *pyknon* are connected. The passage adds a little additional support to the hypothesis that his conception of *dynamis* and Archestratus' notion of *eidos* are not very far apart.

We can take the matter a step further, since there is a passage later in the *Elementa harmonica*, towards the end of Book 3, where Aristoxenus turns the spotlight directly on notes identified by their position in the *pyknon* (69.29-72.28). It appears in the closing stages of a sequence of propositions presented as theorems of harmonics, broadly analogous to the theorems of geometry, each of which is "demonstrated" by reasoning from principles laid down earlier in the text. Aristoxenus seems to have designed them to fit the prescriptions for "scientific demonstration" (*apodeixis*) set out in Aristotle's *Posterior Analytics*, though they conform only rather inexactly to that model. Earlier propositions in the sequence have set out to show which intervals can follow directly after a given interval in a well-formed scalar series, and which cannot. In the passage that concerns us here, Aristoxenus' perspective shifts from interval-sequences as such to the "routes", *hodoi*, that a series of scalar steps can follow from a starting point on a given note; and in all the relevant propositions the note in question is identified by its position in the *pyknon*. After some preliminaries to which we shall return, he argues that if we take the lowest note of the *pyknon* as the starting point there are two routes in each direction, upwards and downwards; from the highest note in the *pyknon* there is one route in each direction; and there is one route in each direction also from the middle note. In each case he specifies exactly what the routes in question are.

Thus a note's relation to the *pyknon* determines the number and nature of the courses that a melody can follow after it has reached it (assuming, that is, that the melody then pursues an unbroken sequence of simple scalar steps); and this plainly implies that what Archestratus calls a note's *eidos* is heavily involved in determining, or perhaps instantiating, its Aristoxenian *dynamis*. One could mount a good argument for the view that the note's position in the *pyknon* is not the only factor involved; in some cases slightly different routes are available from notes that are identical in this respect but occur in different ranges of the system. But in making the identity of a note depend entirely on its relation to the *pyknon*, the distance Archestratus puts between himself and Aristoxenus is small, and the rea-

soning behind it is intelligible. It seems to me certain that Arcestratus had read this part of the *Elementa harmonica* and was heavily indebted to it.

Before going on the next phase of my discussion, I should say something about one minor difficulty. By reducing the number of notes, or categories of note, to three, Arcestratus seems to have ignored the thesis stated in other Aristoxenian sources that some notes are not parts of the *pyknon* at all. There are two aspects to this problem. One, as I said earlier, is that the *pyknon* appears in only two of the three genera of scale that the Greeks recognised. It is a structure which, by definition, occupies less than half the span of a tetrachord, that is, of a perfect fourth,¹⁵ and no such structure occurs in scales of the diatonic genus.¹⁶ But this need not cause us much concern, since Arcestratus is once again following Aristoxenus' example. Through the bulk of the theorematic material in *Elementa harmonica* Book 3, Aristoxenus couches his arguments in terms which, if taken strictly, apply only to systems in the enharmonic and sometimes the chromatic genus. He eventually explains, rather late in the day (*El. harm.* 68.6-12), how one of them can be re-cast in terms that apply to the diatonic, and we are evidently intended to treat this as a guide to a diatonic reformulation of the others too. In effect, we do so simply by identifying the diatonic counterparts of notes and intervals in the other genera either by their names or by their positions within the tetrachord as a whole. Expressing the theorems in terms applying only to genera which contain a *pyknon* is really no more than a convenient shorthand.

We have seen, secondly, that other authors in this tradition include a fourth category of notes, over and above the *oxyppyknoi*, *baryppyknoi* and *amphipyknoi* (or *mesopyknoi*) that Arcestratus recognises. These are the *apyknoi*, which even in the enharmonic and chromatic genera have no place at all in the *pyknon*. Cleonides, for instance, specifies as *apyknoi* the three notes which lie at the very ends of the "perfect systems". The first is *proslambanomenos*, at the bottom of the two-octave system, which obviously has nothing below it, and is separated from the *pyknon* at the bottom of the lowest tetrachord by the interval of a tone. At the other end of the double octave is *nêtê hyperbolaiôn*, separated from the *pyknon* of the tetrachord which it completes by the tetrachord's highest interval. Finally there

¹⁵ For references see n. 8 above.

¹⁶ E.g. Aristoxenus *El. harm.* 51.19-22.

is *nêtê synêmmenôn*, which lies at the top of the “lesser perfect system”, conceived by Aristoxenian writers as an alternative to the “greater” two-octave structure, to which, under this conception, the considerations affecting *nêtê hyperbolaiôn* also apply.¹⁷

There are two ways in which we might try to solve this problem on Archestratus’ behalf. One of them would involve a long detour through intricate material that is found only in Book 2 of Ptolemy’s *Harmonics*; and in the words of Parmenides, πρώτης γὰρ σ’ ἀφ’ ὁδοῦ ταύτης διζήσιος εἶργω, “from this first way of enquiry I hold you back”, not only because Ptolemy was at work four centuries or so after Archestratus, but more importantly because he writes as an obdurate opponent of the Aristoxenian approach to harmonics; sometimes, indeed, he seriously distorts Aristoxenus’ views in the course of his criticisms, and cannot by any stretch of the imagination be represented as a reliable guide to his ideas or those of his followers. The second is much simpler. It takes us back to the preliminaries introducing Aristoxenus’ theorems about the “routes” a sequence can follow from notes in the *pyknon*, to which I promised to return (*El. harm.* 69.29-70.14). The passage begins with a very straightforward announcement: “In the chromatic and the enharmonic, every note participates in the *pyknon*” (*El. harm.* 69.29-30). Aristoxenus’ justification of this thesis in the lines that follow depends on propositions established in the preceding theorems. Some of the relevant theorems are exceedingly problematic, but we need not concern ourselves with the difficulties here. Assuming that they can be resolved, Aristoxenus’ arguments would indeed substantiate his superficially implausible assertion.¹⁸ My point is only that if Archestratus had read this part of Aristoxenus’ work, as I have suggested, or had even heard him expounding his ideas, which is perfectly possible, it could have been enough to convince him that there are no *apyknoi* – except, of course, in diatonic, and we have seen how that issue can be resolved. Perhaps he did not merely accept Aristoxenus’ thesis uncritically, but had grasped the force of his reasoning; and in that case he would seem (at least in this

¹⁷ Cleonides *Harm.* 186.5-7 Jan. Ptolemy denies this structure the status of an independent system; in his view a transition into patterns of intervals which seem to belong to it is merely the result of a simple modulation between two instances of the regular two-octave system set in different *tonoi* (roughly “keys”) that are a perfect fourth apart. See Ptolemy *Harm.* 53.30-57.9 Düring.

¹⁸ For an attempt to unravel the difficulties, see Barker (n. 13 above), 208-222.

respect) to have understood the arguments of the *Elementa harmonica* better than any of his known successors.¹⁹

1.4 The Musical Significance of Arcestratus' Theory: The Evidence of Cleonides

There is nothing in Aristoxenus' surviving works that tells us directly why students of harmonics should take special interest in the aspects of a note's *dynamis* that depend on its position in the *pyknon*; presumably the lost continuation of the *Elementa harmonica* would have shed some light on the question. The hypothesis I have offered elsewhere goes hand in hand with my attempt to resolve the difficulties in the problematic theorems (see n. 18 above), and I shall not revisit it now. But some evidence of a more direct kind can be found in later writers' summary accounts of Aristoxenian doctrines, particularly in the *Introduction to Harmonics* attributed to Cleonides.²⁰ This work and the first Book of Aristides Quintilianus *De musica* are generally reckoned to be our most reliable sources for details of Aristoxenian harmonics that are missing from our texts of the *Elementa harmonica*. On the topic of the classification of notes as *barypyknoi* and so on, however, Aristides gives little help.²¹

In Cleonides the classification plays a significant part in three different contexts and in different sections of the text (Chapters 4, 9 and 13). The subject addressed in Chapter 4 is the notes of the perfect system. It begins by listing them by name, giving separate lists for each of the three genera (182.4-185.15 Jan). Next it distinguishes the fixed from the movable notes, and explains what the terms "fixed" and "movable" mean in this context (185.16-25). The third and final part of the chapter classifies first the fixed

¹⁹) I say this because it may have been the apparent implausibility of the implied assimilation of *proslambanomenos* and the two *nētai* to the class of notes lying at the bottom of a *pyknon*, together with the obscurities of Aristoxenus' supporting argument, that baffled later Aristoxenians, inducing them to modify Aristoxenus' position and identify them as *apyknoi*.

²⁰) The MSS are not consistent in attributing the work to a person of this name. In some it appears anonymously; of the others, one attributes it to Zosimus and a few to Pappus, while the majority assign it, most improbably, to Euclid. All modern scholars, I think, have followed Jan in accepting the attribution to Cleonides, and I do so myself; but this is fairly unenlightening, since we know nothing whatever about him. His date might fall anywhere between the first and third centuries AD; I am inclined to place him earlier rather than later in this period.

²¹) For the main passage in which they appear see Aristides Quintilianus *De mus.* 9.13-26.

and then the movable notes under the headings with which we are concerned (186.1-187.2). It tells us that some of the fixed notes are *barypyknoi* and some *apyknoi*, and specifies which they are;²² and it goes on to divide the movable notes into three kinds, the *mesopyknoi*, the *oxypyknoi* and the *diatonoi*,²³ once again giving a complete list of the notes that fall into each category.²⁴ Since Cleonides draws only two kinds of distinction between notes and anatomises this one so meticulously, he apparently thought it of some importance, but we do not yet know why.

Chapter 9 considers the number of different ways there are of arranging the constituent intervals of the three primary concords consistently with the principles of harmonics, to produce the various *schēmata* ("shapes") or *eidē* ("forms")²⁵ of systems spanning a fourth, a fifth and an octave. Here the classification comes into play as a means whereby the different forms of these systems can be specified. Thus the first form of the fourth, for instance, is specified as the one lying between two *barypyknoi*, the second as that lying between two *mesopyknoi*, and the third as that lying between two *oxypyknoi* (examples are provided in all three cases), since, Cleonides says, "in the enharmonic and the chromatic the *schēmata* of the concords are grasped (λαμβάνεται) by reference to their relation to the *pyknon*".²⁶ This approach is different from the one used by Aristoxenus himself in this context, though they are related. The very last lines of the *Elementa harmonica* that survive before the MSS texts break off enumerate and identify the forms of the fourth. They do not use the terminology of *barypyknoi*,

²² Cleonides treats the note *mesē* as a *barypyknos*, which (unless we pursue the complex strategy of the Aristoxenian theorems I have called "problematic") is clearly true only in one of the two "perfect systems". This is evidently what Bacchius has in mind (*Harm.* 34) when he classifies this note as "*barypyknos* in the conjunctions, *apyknos* in the disjunctions".

²³ The *diatonos* is the higher of the two movable notes in a diatonic tetrachord. The main reason why the lower of the two is not also given special treatment is that in the diatonic systems which Cleonides has in mind, the interval between it and the bottom of the tetrachord is the same as it is in the chromatic genus. The lower movable notes in diatonic and chromatic tetrachords are therefore treated as identical, and are jointly assimilated to the category of the *mesopyknoi*. I shall mention another consideration below.

²⁴ Similar information, though with less detail, is given by Aristides Quintilianus (n. 21 above).

²⁵ Cleonides, like Aristoxenus, uses both terms in exactly the same sense; e.g. 195.4 (*schēmata*), 195.9 (*eidē*).

²⁶ Cleonides 195.9-17, cf. Bacchius *Harm.* 27. As Cleonides goes on to explain, the forms are differently identified in the case of the diatonic, where they are specified by reference to the position (or positions) of the semitone.

oxyppyknoi and so on, nor do they identify notes by their positions in the *pyknon*, as was done a few pages earlier in Aristoxenus' text. But the *pyknon* is still a point of reference. "The first form is that in which the *pyknon* is at the bottom, the second is that in which a diesis lies on each side of the ditone, and the third is that in which the *pyknon* is above the ditone".²⁷ By comparison with Cleonides', this formulation is a little cumbersome, and would have become more obtrusively so when Aristoxenus went on, as no doubt he did, to write in the same vein about the more numerous and complex forms of the fifth and the octave. It would appear that the neater formulation was devised by his successors, drawing on the classification used by Aristoxenus in a passage we looked at above (*El. harm.* 69.29-72.28), while replacing his descriptive phrases with newly-coined adjectives (*barypyknos* for "the lowest note of the *pyknon*", and so on).

In this passage of Cleonides, then, the classification has a role in pinning down the details of structures which are of real musical significance; but it is not obvious that it has any such importance in itself. It is simply a useful analytic instrument in the theorist's conceptual tool-box. The situation is rather different when we come to Chapter 13, where Cleonides' topic is *metabolê*, "modulation". He identifies four types of *metabolê*, modulation of genus, of system, of *tonos* or "key" and of melodic composition (*melo-poiia*); the one that concerns us is the third, which is also the one to which other theorists pay the most attention. Modulation of *tonos* can be (and was) conceived in either or both of two ways. We can think of it, first, as a shift in the course of a composition between identically formed scales set at different pitches; alternatively, we can focus on the alteration in the pattern of intervals that appears in the same range of pitch on each side of the moment of modulation. Thus in the music familiar to us (if we again ignore aspects of it that depend on principles of harmonic progression) a melody that modulates between C major and G major can be conceived as shifting the same scale-structure up through a perfect fifth or down through

²⁷ Aristoxenus *El. harm.* 74.18-22. Aristoxenus is again writing in terms that apply straightforwardly only to the enharmonic genus, in which a tetrachord consists of two quarter-tones and a ditone. When the two quarter-tones are placed side by side they constitute the *pyknon*. Hence Aristoxenus does not refer to the *pyknon* when identifying the second form, since if the quarter-tones lie on opposite sides of the ditone, no two successive intervals combine to form a *pyknon*, which must by definition occupy less than half the span of a perfect fourth. (In Aristoxenian theory the fourth has a span of two and a half tones.)

a perfect fourth, or as rearranging the sequence of intervals that occupies the pitch-range between (for instance) a lower and a higher C.

We need to consider only one of the points that Cleonides makes about modulations of *tonos*. It begins from the assertion that when the two systems involved have more in common, a modulation between them is “more melodic”, and when they have less it is “more unmelodic”.²⁸ This, he says, is because it is essential in any modulation for the *tonoi* on either side of the modulation to share some common ground, which may be a note or an interval or a system (that is, in this context, a sequence of intervals arranged in some particular pattern). “The common ground (*koinônia*) is grasped,” he goes on, “on the basis of a similarity between notes; for when notes which are the same in their relation to the *pyknon* coincide with one another in the modulations, the modulation is melodic, and when they are not the same it is unmelodic” (205.19-206.2).

The gist of Cleonides’ thesis is not hard to grasp. If a modulation is to strike its hearers as “melodic” (we might say “musically intelligible”), the systems between which the melody shifts must have a certain amount in common; otherwise it will seem awkward and abrupt, not so much a transformation of the original system as a plunge into completely alien territory. When notes in the first system coincide in pitch with notes in the second that have the same position in the *pyknon*, it can be guaranteed that some sequences of intervals available in each of the two systems will also coincide; this is shown by Aristoxenus’ theorems about the “routes” that can be taken from each note of the *pyknon* at *El. harm.* 69.29-72.28. It is also the case that the modulations which Cleonides identifies as particularly “melodic”, where the two systems are set a perfect fifth, a perfect fourth or a whole tone apart, are indeed ones in which a substantial number of notes identically related to the *pyknon* fall on the same pitches in each of the two *tonoi*.²⁹

²⁸) Cleonides 205.16-18. His terms for “more melodic” and “more unmelodic”, ἐμμελέστεραι and ἐκμελέστεραι, are comparatives of the adjectives that Aristoxenus uses (as also do many later writers) to designate patterns of notes or intervals which do or do not conform to the laws of harmonics; they appear in this form, translated as “melodic” and “unmelodic”, in the sentence quoted from Cleonides at the end of this paragraph.

²⁹) Cleonides *Harm.* 205.13-14. When we modulate between two fifteen-note systems a perfect fourth apart, for instance, there will be eight such coincidences; by contrast, in a modulation between systems a semitone apart there will be none; see the diagram in Barker (n. 13 above), 220-21.

I have argued elsewhere (see n. 18 above) that it was in connection with modulations between *tonoi* that Aristoxenus put his theorems about “routes” to work, and that his approach is faithfully reflected in that of Cleonides (though we can be sure that Aristoxenus would have developed it at greater length). I need not press that argument here. What is more important is that in this context a note’s relation to the *pyknon* acquires genuine musical significance, since the aesthetic effect of a modulation depends on the way in which notes so characterised are treated by the composer. He may, of course, trust his own impressions without recourse to theory; and he may sometimes deliberately choose to make his melody modulate in an unusually startling manner. But if he wants to be sure about the musical credentials of his creations, he needs to think about the notes of the systems he deploys in their guises as *barypyknoi*, *mesopyknoi* and *oxyphyknoi*, and to pay attention to the Aristoxenian “routes” to which they can lead. It is in any case on them that the effects of his modulations will depend, whether he knows it or not.

There is at least one other piece of evidence to support the view that in treating a note’s relation to the *pyknon* as crucial to its identity, the Aristoxenians were focussing on something recognised as significant by Greek musicians themselves. It comes from their systems of musical notation, whose origins and main outlines certainly pre-date Aristoxenus and are independent of him, though his brand of theory may have had some influence on the form they finally took. The details are too complex and technical to be examined here.³⁰ What is clear, however, is that the allocation of a symbol to a note did not depend wholly on its pitch, or on the sizes of the intervals between it and its neighbours. It is not surprising that the *barypyknoi* in each of the three genera are notated in the same way, since they are fixed notes and their pitches in any given context are identical. What is more striking is that the note which is the *mesopyknon* or its diatonic counterpart in a given tetrachord takes the same symbol regardless of genus, though the interval between it and the *barypyknon* varies according to the genus of the scale; and that the *oxyphyknoi* in enharmonic and chromatic, which are also placed at different intervals from their neighbours, are again represented by the same symbol. (Here the convention for the

³⁰ For a brief account of the notations and their origins, see M.L. West, *Ancient Greek Music*, Oxford 1992, 254-63. A masterly study by Stefan Hagel, illuminating many problems in Greek musical history and practice as well as the notations themselves, is due to be published soon by Cambridge University Press.

corresponding diatonic note is different, but it too is not what one would expect if only the pitches of the notes or the sizes of the intervals were involved.³¹⁾ It seems certain that the notations were not devised by abstractly-minded theorists but by professional musicians themselves, for their own purposes and with an eye to their own conceptions of the identities of the notes which their symbols represented. The classifications we have found in Aristoxenus, Archestratus, Cleonides and others in their tradition are therefore not merely artificial aids to theoretical reflection; they articulate distinctions inherent in the musicians' own understanding of the materials with which they worked.

Part 2: Archestratus and the Relation between μουσική and φιλοσοφία

2.1 *The Comments of Philodemus*

It is time to return to the boldly stated thesis attributed to Archestratus in the passage of Porphyry. Despite the points I have just been making, I suspect that if a professional musician of Archestratus' time had been faced with the assertion that in all his virtuosic musical gymnastics he was producing no more than three different notes, he would have found it more amusing or irritating than instructive. I have tried to shed a little light on its meaning, but no matter what precise interpretation we put on it, its conceptually reductive perspective seems to mark it as a product of abstract or philosophical reflection, rather than of a mind focussed on issues of an exclusively or primarily musicological sort. This fits well with the picture that emerges from the report of Philodemus which I mentioned at the beginning of this paper. It runs as follows.³²

Οἱ δὲ περὶ τὸν Ἀρχέστρατον, καὶ φιλόσοφα λέγοντες εἶναι τῆς μουσικῆς τὰ περὶ τῆς φωνῆς καὶ φθόγγου φύσεως καὶ διαστήματος καὶ τῶν ὁμοίων, ἀνυπομένητοί τινες ἦσαν, οὐχ ὅτι μόνον εἰς ἀλλοτριωτάτην ἐνέβαινον θεωρίαν καὶ παιδαριωδῶς

³¹⁾ The conventions are lucidly explained in West (n. 27 above), 255-57.

³²⁾ I reproduce Delattre's text without his indications of letters that have been emended or supplied, all of which involve very minor and secure alterations, and without reproducing, as he does, the division into lines that is found in the papyrus. For the reference to the passage see n. 2 above; and see also the "Notes complémentaires" in D. Delattre, *Philodème de Gadara: sur la Musique* vol. 2, Paris 2007, 435-36.

ἐλάλουν ὑπὲρ αὐτῶν καὶ πρὸς τὴν ἐπιστήμην ἀχρήστως, ἀλλὰ καὶ διότι μόνοι ἀπεφάναντο μουσικὴν τὴν τούτων θεωρίαν.

Archestratus and his followers, who say that the parts of musical studies concerned with the nature of the voice, the note, the interval and other such things are philosophical matters, are people who should not be tolerated, not only because they have set out on utterly irrelevant theorising, and have babbled about these things childishly in a way that is useless to the science, but also because they are the only people to have declared that the study of these matters is *mousikê*.

The grounds on which Philodemus is attacking Archestratus are not entirely clear, and before proceeding further I need to outline the view I take about one controversial point. Daniel Delattre, the editor of the most recent edition of the *De musica*, contends that Philodemus is accusing Archestratus of contradicting himself. Commenting on the word ἄλλοτριωτάτην, which he interprets as meaning “alien to philosophy”, he asserts that Philodemus “dénonce l’incohérence flagrante de l’école d’Archestratos qui, tout en reconnaissant que les préoccupations des théoriciens de la musique recourent en partie celles des philosophes, se cantonne de fait dans la théorie musicale et proclame que celle-ci rend compte de tout, même du ‘philosophique’”. He returns to this thesis in his comment on the closing words of Philodemus’ critique. “Philodème dénonce ici l’incohérence d’Archestratos qui, tout reconnaissant comme ‘philosophiques’ certaines parties de la théorie musicale, proclamait que la musique n’avait pas besoin de... la philosophie”.³³

But I can see no good reason for interpreting the text in this way, which seems to import into it a good deal more than it says. Philodemus does not pull his punches, and if he had thought that Archestratus’ position was self-contradictory he would almost certainly have said so explicitly. It seems to me much more probable that the last clause of the passage means simply that Archestratus and his followers were the only people to include “philosophical” reflections on the nature of the voice, the note, and so on under the heading of *mousikê*; and this by no means implies that music or musical theory needs no assistance from aspects of philosophy which it does not itself contain. The passage as a whole, as I understand it, gives two reasons for dismissing Archestratus’ work: first, the reflections on the nature of notes and other such things which he calls “philosophical” do not really amount to specimens of philosophy; and secondly, even if they did,

³³) Delattre (n. 2 above), 267 nn. 2-3. The “...” preceding the last two words is his own.

musical theory has no business dabbling in such matters. In that case when Philodemus accuses Arcestratus of embarking on a piece of ἄλλοτριωτάτη θεωρία, he must mean (for the first reason) that it is alien to *mousikê*, not to philosophy. The *epistêmê* to which he says it is useless will be musical science if he has the second reason in mind, but philosophy if he is thinking of the first (on the grounds that what such people say amounts only to “childish babbling”); and it is the second reason that motivates what he says in the last clause of the passage.

2.2 Definition, Matter and Form

On this interpretation the passage fits smoothly into its immediate context, since Philodemus devotes the whole stretch of argument in which it is embedded (col. 135.23-140.14) to a series of attacks on the claim advanced by various musical theorists and echoed by Diogenes of Babylon that their subject has substantial philosophical value. But we need to ask whether he gives us any clues about the specific aspects of philosophy to which Arcestratus thought that his theories contributed. I suggest that we can find some promising indications if we combine the passage I have quoted with one that appears a little earlier in the text, at col. 135.24-35. Here Philodemus records that according to Diogenes, harmonic theory contributes to the development of understanding (σύνεσις) through its construction of “definitions, divisions and demonstrations”, and so far as I can tell from my study of the rather mutilated text, his criticisms of this view focus especially on the claim about definitions. If we now turn back to the passage on Arcestratus, while remembering that Diogenes was using his work as an example of the kind of theorising he had in mind, we can see that the project of definition is likely to have been heavily involved in it. The enquiries which Arcestratus characterised as “philosophical” were concerned, we are told, with the “nature”, φύσις, of the voice, the note, the interval and so on; and it is only to be expected that the goal of an investigation of something’s nature will be an appropriate definition.

There would be nothing surprising or unusual about the fact, if it was one, that Arcestratus made some attempt to define the items he is said to have studied. The writings of the harmonic theorists are packed with such definitions, and there were frequent controversies about their minutiae.³⁴

³⁴) For an elaborate example in which rival definitions of the note are discussed, see Porphyry *In Ptol. Harm.* 86.2-87.19.

What arouses Philodemus' ire is apparently Arcestratus' explicit characterisation of his definitions, or the reasoning surrounding them, as "philosophical"; and if we now return to the passage of Porphyry from which we began, we may be able to pick up some hints about the way in which he tried to justify this description. Underlying his specific claims about the notes is the thesis that the identity of any note depends entirely on what he calls its form, and that its pitch, in particular, is irrelevant, since even in the context of a single scale, items that he regards as instances of the very same note will appear at several different pitches.

Now we have seen that the general line of thought involved here is derived fairly directly from Aristoxenus, but that the terminology is different, replacing Aristoxenus' references to a note's "function", δύναμις, with allusions to its "form", εἶδος. Given that the latter term already had a well-established and quite different use in harmonic theory, we may reasonably suppose that Arcestratus thought he had good reasons for making the change, and it is not too hard to guess what they were. Since he was plainly following in Aristoxenus' footsteps, and may even have been one of his students in the Lyceum, the "philosophy" to which he was committed was presumably Aristotelian, at least in its outlines, and his understanding of the concepts of δύναμις and εἶδος will have had a Peripatetic flavour. The term δύναμις may then have struck him as inappropriate for the purpose he had in mind, that is, for specifying what a note actually and essentially *is*, since in Aristotelian usage it often refers to a mere potentiality and is directly contrasted with its "actuality". We can go a step further. In Aristotle's writings the notion of form, εἶδος, goes hand in hand with its correlate, ὕλη, "matter", and the matter in which a note is instantiated must evidently be a sound with some determinate pitch. Thus in denying that a note's pitch has any bearing on what it is, and insisting that it should be defined by reference to its form alone, Arcestratus is implicitly excluding from the definition any allusion to its matter.

Aristotle's discussions of the question whether definitions should be couched in terms of form, matter, or a combination of the two are well known, and I shall not discuss them in detail here. The point I want to make is that if – as I am suggesting – Arcestratus drew attention to issues of this sort in connection with his own definitions, he was involving himself in problems with an undeniably philosophical pedigree. He also had Aristotle's authority for the belief that he was not the first musical theorist to do so, since in one of the passages where these issues emerge Aristotle mentions Archytas as a champion of one approach to the issue, stating that

he propounded definitions in terms referring to both matter and form, and giving examples of them.³⁵ They are not, admittedly, definitions of terms relevant to music; and I have indicated elsewhere my doubts about the attempt of Carl Huffman, in his magnificent study of Archytas, to credit him with a substantial “theory of definition” and to link it with aspects of his work in harmonics.³⁶ But that is unimportant. All that matters is that Arcestratus could readily have inferred from the passage in the *Metaphysics* that Archytas had indeed entered into the debate in which Aristotle was involved, and that at least in so far as the definition of a note is concerned he evidently rejected the Archytan position as Aristotle describes it.

The suggestion that Arcestratus involved himself in this debate may be thought unduly speculative, and I shall no doubt be compounding my crimes by proposing that he always or even sometimes represented himself as a champion of definitions set exclusively in terms of form. But let us pursue these notions a little further. Philodemus specifies two other items whose “natures” this theorist investigated in what he took to be a philosophical manner, φωνή, “voice”, and διάστημα, “interval”; and at least so far as the second of these is concerned, there was ample room for discussion on very similar lines to those involved in Arcestratus’ treatment of the note. Once again the starting-point is in Aristoxenus. The only explicit definition of “interval” that he gives looks quite straightforward: διάστημα δ’ ἐστὶ τὸ ὑπὸ δύο φθόγγων ὀρισμένον μὴ τὴν αὐτὴν τάσιν ἔχοντων, “an interval is that which is bounded by two notes which do not have the same pitch” (*El. harm.* 15.24-25). It would be easy to assume that any such interval is to be defined by its extent, which Aristoxenus (unlike Pythagorean and Platonist theorists) always represents as a quasi-linear “distance” and to which he attaches a “size” (μέγεθος). But elsewhere Aristoxenus repeatedly distinguishes musical intervals from the sizes which they have in their particular instantiations, just as he distinguishes notes from the pitches assigned to them in particular compositions or performances.

Thus in the course of a polemic against people who suppose that the culmination or “limit” (πέρας) of harmonic understanding consists in the capacity to write melodies in a notation, he argues that the notation indicates only the μετέθῃ of the intervals and fails to distinguish all their

³⁵) Aristotle *Metaphysics* 1043a 14-26.

³⁶) C.A. Huffman, *Archytas of Tarentum: Pythagorean, Philosopher and Mathematician King*, Cambridge 2005, especially 74-76, 490-505; see also my review in *Oxford Studies in Ancient Philosophy* 2006, 297-321, in particular 314-318.

more important attributes (39.26-40.11); and in response to some bone-headed listeners who have not understood what he says about incomposite intervals (ἁσύνθετα διαστήματα), he tells them that their “ignorance” stems from their failure to grasp the difference between an incomposite interval and an incomposite μέγεθος (60.19-61.4). As that passage makes clear, an interval should not be specified by its size, but by reference to the names of the notes at its boundaries; and the same thesis, supplied with extensive argumentative support, emerges very clearly from an elaborate piece of reasoning at 68.2-69.28. The essential point is that an interval acquires what we might call its melodic nature or meaning not from its size but from its place in a scale. This is determined by the identities of the notes that bound it, defined in turn by their δυνάμεις; and these can retain their identities while the size of the gap between them changes.³⁷ In one sentence in Book 2, Aristoxenus explicitly attributes δυνάμεις to the intervals themselves.³⁸ It seems very probable indeed, especially in the light of his substitution of the term εἶδος for Aristoxenus’ δύνάμις in his account of the notes, that Arcestratus would have regarded what identifies and defines an interval as its form; the size which it happened to have in any of its concrete occurrences would serve, presumably, as its matter.

The remaining item in Philodemus’ list is voice (φωνή), a word used by Aristoxenus and his followers to refer to the sound of an instrument as well as that made by a singer or a speaker. One might think it unlikely that anyone would have offered a definition of it from which all trace of “matter” (in this case sound) had been eliminated. But Aristoxenus makes no attempt to define it. In his one full-dress discussion of the subject (8.13-10.24) what he is trying to clarify is the way in which the singing voice moves in the dimension of pitch, and how this is distinguished from another way of moving which, he says, is the one we use in speech; and he describes the two as different “forms” (ιδέαι) of movement. He refers nowhere in this discussion to sound as such; he treats the project of specifying its nature in material terms as irrelevant to harmonics, since he is

³⁷) This thesis is at work in the passage just cited, 68.2-69.28, and often elsewhere. At 22.22-27.14, for instance, Aristoxenus painstakingly works out the sizes of the “ranges” (τόποι) over which the notes bounding such intervals can move, insisting along the way that the number of positions available for such a note within the relevant range is unlimited, ἅπτεροί εἰσι τὸν ἄριθμόν (26.13-27).

³⁸) 33.6-9, where Macran’s emendation of the text is unnecessary and misleading.

concerned only with the phenomena in the guise in which we hear them;³⁹ and he never offers any description even of “sound-as-perceived”. What matters to him is only the special “form” taken by the voice’s movement in the context of melody. Even if Arcestratus had not been a devoted Aristoxenian it would have been unsurprising if he had followed Aristoxenus in this respect, since the passage was repeatedly echoed or paraphrased in later treatises, even by “Pythagorean” theorists such as Nicomachus; I have come across at least a dozen examples.

2.3 *Porphyry’s Further Discussion: The Criteria of Reason and Sense-Perception*

My arguments so far have depended throughout on the evident affinities between Arcestratus’ work, as represented in Porphyry’s report, and that of Aristoxenus. But Didymus, Porphyry’s principal witness on questions about the criteria, draws a sharp distinction between the two theorists’ approaches. Each of them, he says, uses both the criterion of sense-perception and that of reason in making judgements in the field of harmonics, but whereas Aristoxenus gives precedence to perception Arcestratus reverses the order; in his work it is reason that takes pride of place.⁴⁰ Everything we know about Didymus suggests that he is a reliable witness and a perceptive commentator. Porphyry agrees with his diagnosis, and in the second part of the passage from which we began he offers some observations in its support.

ἢ συμβαίνει δὴ τοῦτον χρῆσθαι μὲν καὶ τῇ αἰσθήσει κριτηρίῳ, ἐπεὶ δίχα αὐτῆς οὐκ ἂν φανεῖται ἕκαστον τῶν εἰλημένων, οἷον ὅ τε φθόγγος καὶ τὸ εἶναι τρεῖς ἐν πυκνῷ μόνον χώρας αὐτοῦ. βεβαιοῦται γὰρ τοῦτο διὰ τοῦ πυκνὸν πρὸς πυκνῷ μὴ τίθεσθαι μήτε ὅλον μήτε μέρος. τὸ μέντοι θεώρημα ὅλον λογικῶς συνήκται· τὰ τε γὰρ τῶν φθόγγων εἶδη, ὅτι τοιαῦτ’ ἐστὶ, λόγῳ θεωρεῖται, ἐπεὶ τάξεις εἰσὶ τινες τῆς σχέσεως αὐτῶν· τὸ τε συμπέρασμα, ὡς εἰπεῖν, τοῦ θεωρήματος – σοφιστικώτερον ὂν τὸ λέγειν τὸ εἶδος μόνον φθόγγου καὶ <τὸ> νοητὸν οὕτως ἀπολιπεῖν αὐτό – δηλον ὡς ἐστὶ λογικὸν ὅλον, ὅθεν καὶ οὕτως ὁ τρόπος δεδείχθω ἐντεῦθεν.

In this way it turns out that on the one hand he uses sense-perception as a criterion too, since without it the particular items that he adopts would not be apparent, the note, for example, and <the thesis that> there are only three places for it in the *pyknon*. For this is confirmed through <the proposition that> a *pyknon* is not placed next to a

³⁹) See especially 12.4-19, 32.17-28.

⁴⁰) Didymus quoted at Porphyry 26.27-29, 27.18-28.23.

pyknon either as a whole or in part. The theorem as a whole, however, is put together on the basis of reason (*logikós*); for <the proposition that> the forms of the notes are of these sorts is worked out by reason, since they are specific orderings of the relation between the notes. And what one might call the “conclusion” of the theorem – since it is rather sophistic to speak only of the form of a note and thus to leave it as something purely intelligible (*noêton*) – is obviously based wholly on reason. From this, then, let this approach, too, have been shown (27.7-16).

As I said earlier, it is clear that what Porphyry gives us in this passage are almost exclusively his own inferences, based on the information about Archestratus that he has previously provided. But he makes one small addition to the information itself, since when he explains in the second sentence how the thesis that there are only three places for a note in the *pyknon* is confirmed, he is presumably recording the way in which Archestratus confirmed it. An equally acceptable translation of the beginning of the sentence, in fact, would be “For he confirms this through...”, assigning the verb *βεβαιούται* to the middle voice instead of the passive. What this shows is that Archestratus was indeed drawing on the passage of Aristoxenus that deals with the “routes” from each of the notes of the *pyknon*, since there we find the same “confirmation” in almost the same words: “It is easy to grasp that there are three places for the notes in the *pyknon*, since neither a *pyknon* nor a part of it is placed next to a *pyknon*. It is clear that for this reason there will not be more places for notes than has been said” (*El. harm.* 70.15-20).

In the context of Porphyry’s discussion this seems strange. The thesis which is confirmed in this way is one whose adoption by Archestratus, according to Porphyry, shows that he sometimes relies on the criterion of perception. But the process of establishing it in this way is evidently not grounded in perception alone; it involves reasoning. Furthermore, the confirming proposition itself cannot be regarded as recording a straightforward perceptual datum, and Aristoxenus offers an argumentative proof of it in the first theorem in the series in *El. harm.* Book 3, where it is derived from the most fundamental of the high-level principles of his harmonic theory.⁴¹ It is true that the principle itself, like all Aristoxenus’ principles, must ultimately be rooted in sense-perception. He explicitly rejects recourse to principles excogitated through reason alone; all of them have to be

⁴¹ *El. harm.* 62.33-63.5. For a statement of the principle and an indication of its importance see 53.33-54.11.

reached through a procedure close to the one that Aristotle describes in the last chapter of the *Posterior Analytics*, by induction or abstraction from repeated perceptual experiences.⁴² But that does not alter the fact that the propositions to which Porphyry draws attention are established *logikôs*, by reasoned arguments.

There seems, then, to be some confusion in Porphyry's line of thought at this point. But there is no doubt about the passage's general tendency. When he says in the first sentence that "on the one hand" Arcestratus uses perception as a criterion "too", the expressions "on the one hand" (μέν) and "too" (καί) must be looking forward to what follows, that is, to the "however" (μέντοι) of the third sentence. The sense of the first statement is in effect concessive: "while it is true that he also uses perception as a criterion, the theorem as a whole is put together on the basis of reason". What Porphyry is primarily trying to show is that although Arcestratus does not dispense with sense-perception entirely, he is one of those who "assign a certain priority to reason", as Didymus had put it in the remark quoted directly from his work (26.28-29). His contention rests partly on the unsurprising fact that the "theorem" enunciated by Arcestratus – which must, as the sequel shows, be the argument concluding that there are only three notes, or "forms" of note, not the Aristoxenian theorem to which Porphyry has just referred – is a "logical" or "rational" construction. Plainly it is not simply a report about a perceptual impression. But the parenthesis in the penultimate sentence suggests another point too, that the "form" to which Arcestratus refers, and which according to Porphyry's account he apparently treated as constituting the whole of what a note is, is something accessible only to the mind, not to the senses.

The passage of Porphyry seems to treat Arcestratus' view about notes as representative of his whole approach to harmonics; it provides the grounds for his assent to the judgment of Didymus that Arcestratus was one of those who gave reason precedence over sense-perception in their studies in the discipline. It is of course unsurprising that the assignment of priority to reason should be coupled with an emphasis on form, given that both Plato and Aristotle, along with many other philosophers, regularly credit reason with a grasp on form, and associate sense-perception with matter. It seems fairly clear that it was because Arcestratus gave pride of place in

⁴² See for instance his scathing remarks about people who devise explanations grounded in reason alone at *El. harm.* 32.19-28, and his positive assertions at 43.25-44.20.

his musical theory to abstract arguments based on reasoning rather than empirical observation, leading to conclusions about the “forms” of various ingredients of melody (perhaps particularly, as I have suggested, when formulating and justifying his definitions), that his approach, rooted though it was in the work of Aristoxenus, struck the later commentators as distinct from that of his predecessor.

As my earlier remarks have suggested, and as will be clear from an inspection of the *Elementa harmonica*, the topics on which we are told that Arcestratus pronounced – voice, note and interval – are ones whose treatment could very plausibly be represented as “philosophical”, based primarily on reasoning and concerned with form, without any substantial departure from Aristoxenus’ own discussions of them.⁴³ All that is needed is a shift in emphasis, drawing attention to the roles played in them by logically constructed demonstrations (ἀποδείξεις), to their focus, in Aristotelian terms, on form by contrast with matter, and to the essential nexus between form and reason. Some methodological remarks by Aristoxenus himself could be exploited in this connection. ἀνάγεται δ’ ἡ πραγματεία εἰς δύο, εἷς τε τὴν ἀκοὴν καὶ εἰς τὴν διάνοιαν. τῇ μὲν γὰρ ἀκοῇ κρίνομεν τὰ τῶν διαστημάτων μεγέθη, τῇ δὲ διανοίᾳ θεωροῦμεν τὰς τούτων δυνάμεις: “The enquiry depends on two things, hearing and reason. For through hearing we judge the sizes of the intervals, and through reason we apprehend their δυνάμεις” (*El. harm.* 33.4-9). In Arcestratus’ work these δυνάμεις become εἶδη, “forms”, as we have seen, and διάνοια (rather than λόγος) is Aristoxenus’ regular term for thought grounded in reasoning rather than in direct observation, “reason” in the sense intended by Didymus and Porphyry. In justifying his claim that some aspects of musical theory are “philosophical” Arcestratus need have done little more than to focus attention on the character of important sections of the *Elementa harmonica*.

⁴³) Aristoxenus’ *Elementa harmonica* has many prominent features that are drawn directly from a philosopher’s repertoire, in an entirely uncontroversial sense of the elastic term “philosopher”. Compare Porphyry 4.18-21, where he says of Ptolemy that he took “the philosophy of the ancient writers” as his most important starting-point, and then adds that the earlier Pythagoreans and Aristoxenians also “enhanced the scientific aspect of their theories” (τὸ ἐπιστημονικὸν ἐν ταῖς θεωρίαις συνήϋξισαν) by drawing on this source. Substantial portions of Porphyry’s own discussions are concerned with central issues in epistemology, logic and kindred branches of philosophy.

2.4 *Closing Reflections*

But in its historical context the claim has more significance than this suggests. Archestratus' work belongs to the Peripatetic tradition, and by the time he was writing (on any reasonable estimate of his date), the researches of Aristotle's successors had shifted away, for the most part, from core areas of philosophy, and had dispersed themselves over a range of specialised sciences and other disciplines. The territories normally thought of as central to philosophy were left in non-Aristotelian hands, most prominently those of Platonists, Epicureans and Stoics. What Archestratus seems to have argued is that at least one of the disciplines to which Peripatetics were now devoting their efforts involved no abandonment of philosophy; that philosophy was embedded in the discipline and was indeed essential to it. Conceivably he went further, and maintained that philosophical issues *only* become seriously significant in their application to the particular "kinds" that form the subject-matters of specialised scientific enquiries. This would be a defensible position for an Aristotelian to adopt, and it would be interesting to know whether such attitudes emerged among specialists in other post-Aristotelian sciences. But I cannot pursue that question here.

If Archestratus was trying to show that sciences of the kind he was concerned with should be reckoned as major players in the philosophical arena, his pronouncements seem to have fallen on deaf ears. The specialised work of Aristotle's successors made little impact on the major philosophical movements of the Hellenistic period. If he also hoped that his efforts would integrate Aristoxenian harmonics, in particular, more closely with mainstream philosophy, the later history of the tradition would have disappointed him. All our evidence about it in the later Hellenistic and Roman periods indicates that it survived almost exclusively either as a routine target for the criticisms of mathematical theorists, or in unappetising summaries of received doctrine, sometimes presented as dismal textbooks for unfortunate school-children. Aristoxenians in those periods made very few new contributions to their science's content and none at all to reflections on its epistemological or metaphysical foundations; their treatises preserve no traces even of Aristoxenus' own discussions of such matters. No one we know of followed the path indicated by Archestratus, and he was largely forgotten; harmonics and philosophy walked hand in hand

only in the domains of the triumphant Pythagoreans and Platonists, and in the ethical writings of Stoics who drew on their ideas.⁴⁴

Appendix: The Text of Porphyry *In Ptol. Harm.* 26.30-27.7

Οὐκ ἀχρεῖον δ' ἂν εἶη παρεκβατικώτερον καὶ τούτου σαφηνίσαι τὸν τρόπον ἕνεκα διορισμοῦ τῶν νῦν ἡμῖν χρειωδῶν. ἀποφηνάμενος γὰρ οὗτος τρεῖς εἶναι τοὺς σύμπαντας φθόγγους, βαρύπυκνον, ὀξύπυκνον, [27.1] ἀμφίπυκνον, βαρύπυκνον μὲν ἀφ' οὗ πυκνόν ἐστιν ἐπὶ τὸ βαρὺ θεῖναι, ὀξύπυκνον δ' ἐναντίως ἐξ οὗ πυκνόν ἐστιν ἐπὶ τὸ ὀξύ θεῖναι, ἀμφίπυκνον δὲ τὸν μεταξὺ⁴⁵ τούτων ἔχοντά φησιν ἐνδέχεσθαι· καὶ ἐν ἐνὶ φθόγγῳ κατέχεσθαι, ἐπειδὴ δυνατόν ἐστι πλείους τάσεις τοῦτον <δέχεσθαι> καὶ πλέξαι ἐν αὐταῖς μέλος ἐνὸς εἴδους μενούσης τῆς τάσεως, ὥς <δυνατὸν τὰς ὑπάτας> ἀμφοτέρως καὶ <τῇ> παραμέσῃ καὶ τὰς πάσας τοιαύτας ὀξυπύκνους εἶναι φθόγγους, ὥσάν φηι ἐκεῖνος.

I pointed out earlier that the positions in the *pyknon* which the text, as we have it, assigns to the *barypyknos* and the *oxypyknos* are reversed in all other writings that mention them. It is true that the relevant terminology is apparently post-Aristoxenian and may conceivably have originated with Archestratus himself, who in that case would have been free to deploy it however he wished. But the usage indicated in the text is clearly counter-intuitive, and if Archestratus was indeed its pioneer one would have expected writers who subsequently adopted it to treat the terms in the same way as he did. We therefore need to consider whether the text is at fault; and it could in fact be emended quite simply to give a sense in line with the later tradition. Instead of βαρύπυκνον μὲν ἀφ' οὗ πυκνόν ἐστιν at 27.1 we could read for instance βαρύπυκνον μὲν ὃν πυκνοῦ ἐστιν, and make a parallel change in the clause about the *oxypyknos* at 27.2.⁴⁶ The sense would then be: “the

⁴⁴) See especially A.A. Long, “The Harmonics of Stoic Virtue”, in his *Stoic Studies*, Cambridge 1996, 202-223.

⁴⁵) See n. 7 above.

⁴⁶) David Creese has pointed out to me that if these emendations are correct, the corruptions in the text will probably have developed through at least two stages, “a first in which οὗ was written for ὃν, and a second in which the prepositions were added to make sense of the genitives”. He adds that in this case it is interesting that two different prepositions are inserted instead of the same one twice. I am very grateful to Dr Creese for these and other comments on a draft of this paper. One might perhaps argue that the variation of the

barypyknos is that which one can place on the lower side of a *pyknon*, and the *oxypyknos* is that which one can place on the upper side of a *pyknon*".

But we are not yet out of the woods. A few lines later Porphyry attributes to Archestratus a statement which names certain notes that are *oxypyknoi* by way of examples. Here the text is certainly in some disarray, if only because the adjective ἀμφοτέρως ("both") has no noun to qualify. Düring solves the problem by inserting τὰς ὑπάτας, giving the sense "both of the *hypatai*"; and the two notes called *hypatai*, which lie at the bottom of their respective tetrachords, are indeed *oxypyknoi* by the eccentric standards of the received text of 27.1-2. (By the criteria of most writers they would be *barypyknoi*.) Even if we ignore the problematic "both" and reject Düring's supplement, there still remains in the MSS text the name of another note, *paramesê*, which will also count as an *oxypyknos* only if the received text of 27.1-2 is correct. If it is not, we would have to emend the text in a different way. One plausible possibility would be to eliminate Düring's supplement, and instead of reading ἀμφοτέρως καὶ παραμέσῃν at 27.6, which makes no sense, read ἀμφοτέρως τὰς παρανήτας, "both of the *paranêtai*". *Paranêtê* is the name of the second-highest note in each of the upper tetrachords of the system, and in each of them it is indeed (by normal standards) an *oxypyknos*. While we are considering this clause, it is perhaps worth adding that Düring's alteration of οἶον to ὥς at 27.5 seems to me unnecessary, and his insertion of δυνατόν in the same line is positively obstructive. With all his supplements removed and the emendation I have proposed adopted, the clause would mean: "as for instance both of the *paranêtai* and all other such notes are *oxypyknoi*", which would face no objections from any of the other authors in this tradition; and this version of the text would have the merit of being rather closer to that of the MSS than Düring's. But I do not insist on any of these emendations. Perhaps Archestratus' usage really was as peculiar as the text printed by Düring suggests.

preposition weakens the case for this or any similar emendation, on the grounds that it is unlikely to have been the work of a copyist.